RAPT CONSULTING

Acoustic Assessment – 25-27 Kennington Drive, Tomago NSW.

Prepared for
Monteath & Powys

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Relationships Attention Professional Trust

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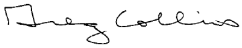
2220289_210520	0	Gregory Collins-MAAS		21 May 2021
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1. Introduction

1.1 Background

RAPT Consulting has been engaged to undertake an acoustic assessment for Monteath & Powys to inform a Modification Application SSD (Modification Report)– Asphalt Batching Plant 25-27 Kennington Drive, Tomago (Lots 14 and 15 of DP 270494) in the Port Stephens local government area.

The proponent Colas seeks approval for the following (the proposal):

- To increase the utilisation of the approved Asphalt Plant from 150,000 to up to 250,000 tonnes per year. This increase does not involve an increase in size of the overall plant or change any existing equipment or process, rather seeks to increase the utilisation of the plant's existing capability. Operational hours additionally remain unchanged. Therefore operationally, the plant remains the same.

The proposed increase in utilisation will act to enable Colas to meet future market demands and to provide adequate supply of asphalt to support local and regional development projects.

No construction works or changes to the approved hours are sought as part of this proposal.

The sites original approval dates back to 12 December 2007 Application Number 07_0031.

The project site and surrounding area is shown in Figure 1-1.

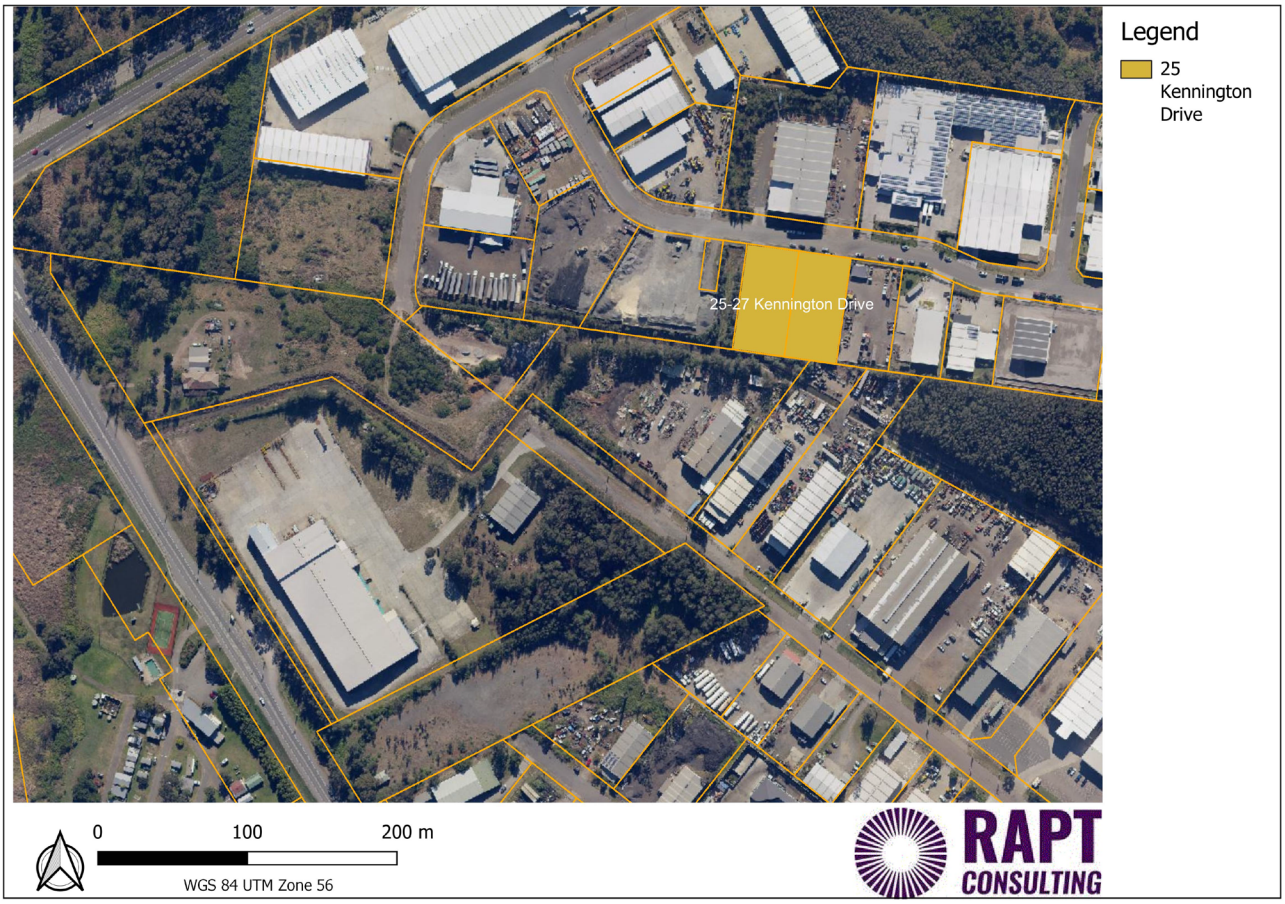


Figure 1-1 Site and Surrounding Area

1.2 Assessment Objectives

This acoustic assessment considers the potential impacts of the operation of the proposal. The purpose is to assess potential noise and vibration from the project and to recommend mitigation measures where required.

The outcomes of this assessment include recommendations for potential noise and vibration mitigation and management measures designed to achieve an acceptable noise amenity for residential (dwelling) occupants and other sensitive receivers surrounding the study area.

1.3 Scope

The acoustic assessment scope of work included:

- Initial desk top review to identify noise sensitive receptors from aerial photography
- Undertake noise measurements to determine ambient and background noise levels
- Establish project noise goals for the operation of the proposed project
- Identify the likely principal noise sources during operation and their associated noise levels
- assessment of potential noise, vibration and sleep disturbance impacts associated with operation aspects of the project
- provide recommendations for feasible and reasonable noise and vibration mitigation and management measures, where noise or vibration objectives may be exceeded.

1.4 Relevant Guidelines

The relevant policies and guidelines for noise and vibration assessments in NSW that have been considered during the preparation of this assessment include:

- Assessing Vibration: A Technical Guideline, Department of Environment and Conservation (DEC), 2006
- British Standard BS7385.2 - 1993 Evaluation and Measurement for Vibration in Buildings, Part 2 - Guide to damage levels from ground borne vibration 1993
- DIN 4150: Part 3-1999 Structural vibration – Effects of vibration on structures 1999
- NSW Road Noise Policy (RNP), Department of Environment, Climate Change and Water (DECCW), 2011
- Noise Policy for Industry (NPfI), Environment Protection Authority (EPA), 2017.

1.5 Limitations

The purpose of the report is to provide an independent acoustic assessment for the proposal.

It is not the intention of the assessment to cover every element of the acoustic environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the acoustic assessment represent the findings apparent at the date and time of the assessment undertaken. It is the nature of environmental assessments that all variations in environmental conditions cannot be assessed and all uncertainty concerning the conditions of the ambient environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for acoustics, noise were referred to. This work has been conducted in good faith with RAPT Consulting's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2. Existing Environment

2.1 Receptors

The area surrounding the site is zoned IN1 General Industrial, E2 Environment Conservation and SP2 Infrastructure. A map showing the land use zonings in the vicinity of the proposal are shown in Figure 2-1.

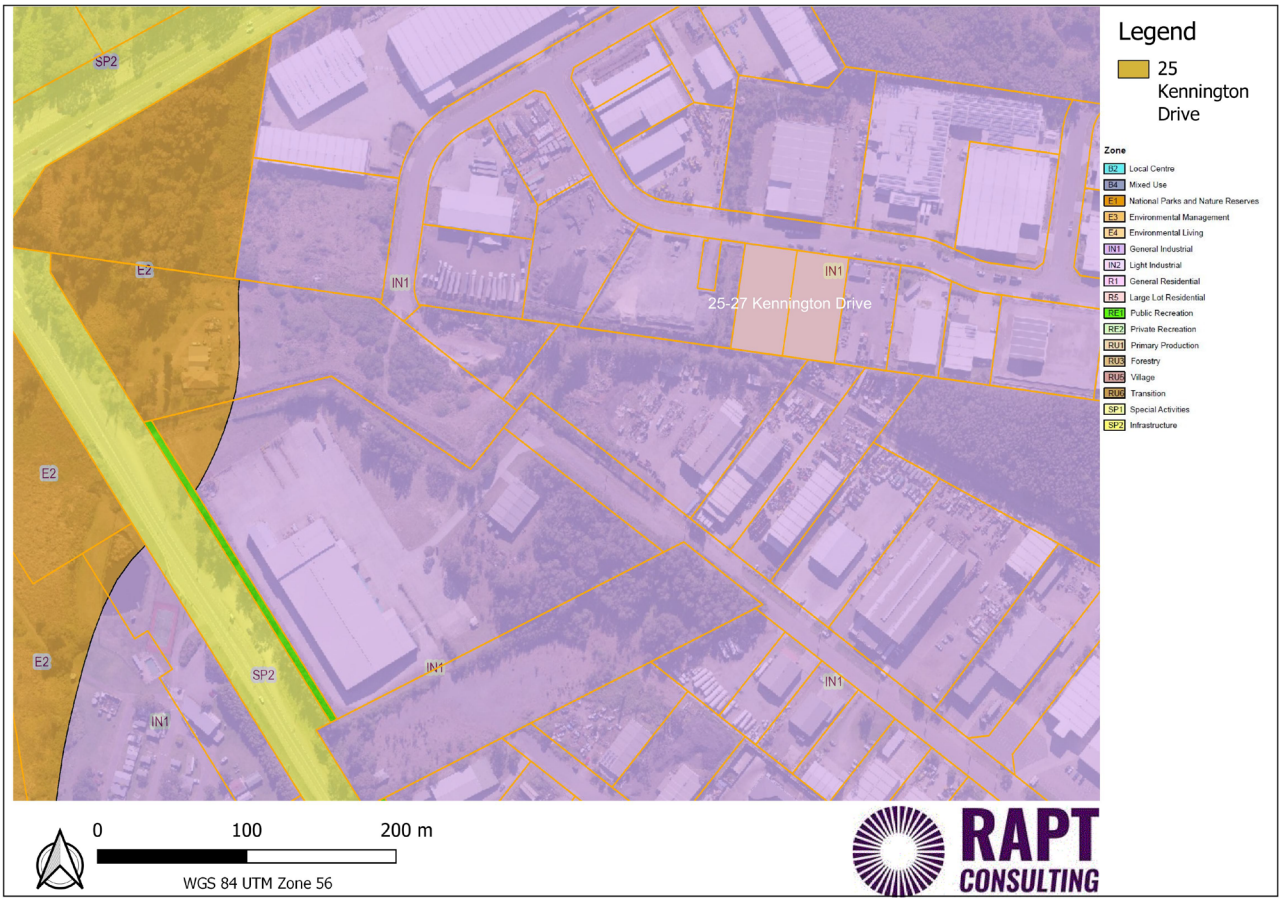


Figure 2-1 Land Use Zonings (Source: RAPT Consulting)

While the area surrounding the proposal is industrial and closest receptors are industrial and / or Commercial, Closest residential and holiday maker receptors to the proposal assessed in this acoustic assessment are identified in Table 2-1 and Figure 2-2.

Table 2-1 Receptors and Distance to Study Area

Receiver ID	Address	Distance From Project Area	Receptor Type	Easting	Northing
R1	838 Tomago Road Tomago, NSW 2322	360m	Residential	378148	6368176
R2	819 Tomago Road Tomago, NSW 2322	475m	Holiday Accommodation / Permanent Resident Caravan Park	378109	6367954

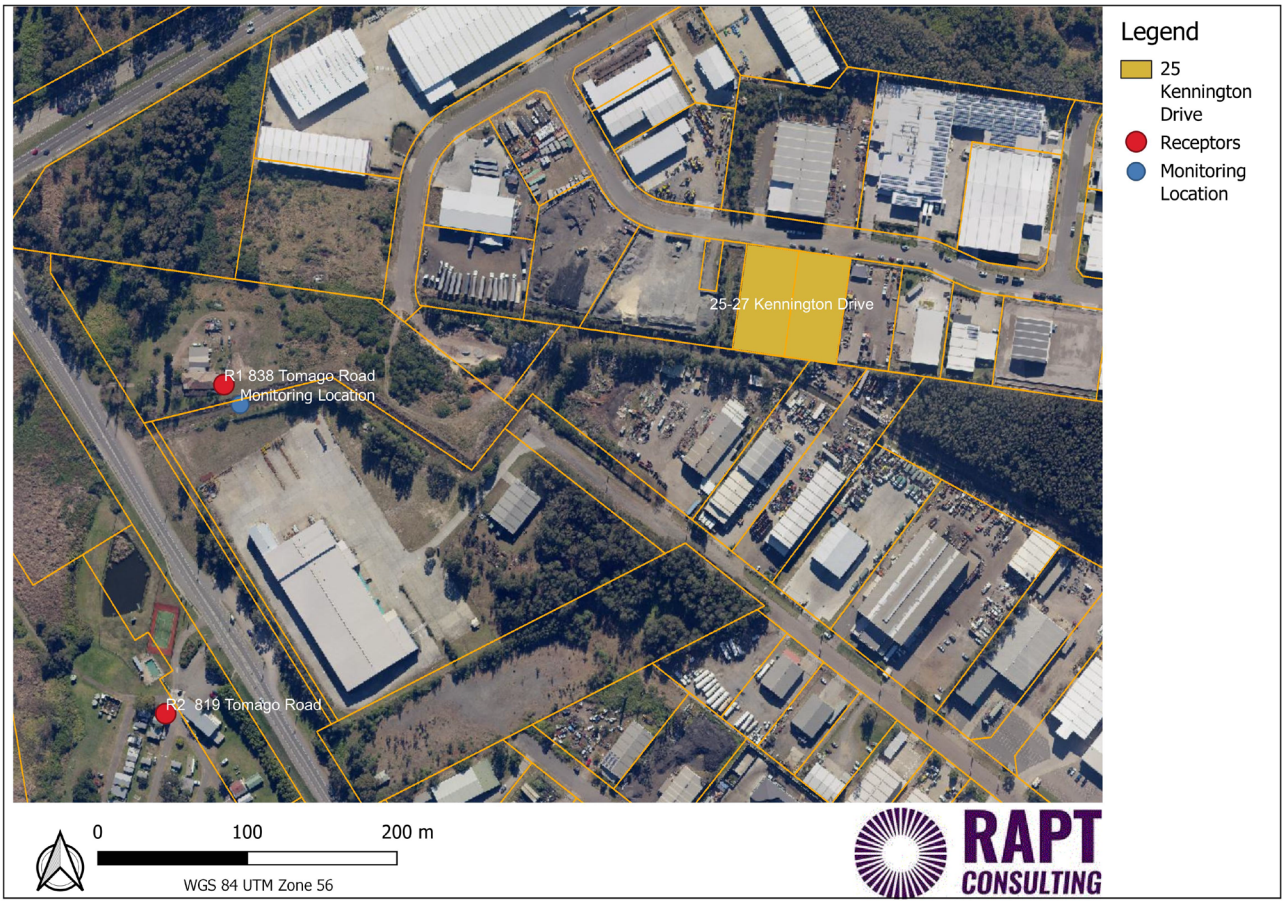


Figure 2-2 Sensitive Receptors Surrounding The Proposal Site (Source: RAPT Consulting)

While the nearest residential receptor R1 lies within the E2 zone, it is located in a complex noise environment and was classified as Urban for the purposes of the acoustic assessment for the approval undertaken by Hunter Acoustics *Acoustic Assessment For Proposed Asphalt Batching Plant Lot 14 and 15 Kennington Drive Tomago 15 June 2007.*

2.2 Background and Ambient Noise

To establish background and ambient noise levels, noise monitoring was undertaken by RAPT Consulting from 26 April to 03 May 2021 at the north western boundary of the BlueScope Distribution facility which is adjacent to the nearest potentially affected residence located at 838 Tomago Road which at the time of the assessment, the property was vacant with no access. Therefore, this location was selected.

Site observations noted the location was considered indicative of the local ambient noise environment and this site also presented as secure location whereby minimising the risk of theft or vandalism to the monitoring equipment. Additionally, they are considered as acceptable locations for determination of the background noise with consideration to the NSW Environment Protection Authority's (EPA's) – Noise Policy for Industry (NPfI). During site visits it was noted that the ambient noise environment is complex and influenced by road traffic noise, a variety of industrial activity, wildlife sources and an underlying urban 'hum' which primarily described the ambient noise environment and is indicative of an urban and commercial / industrial environment.

The monitoring location is shown in Figure 2-3.

Figure 2-3 Monitoring Location.

Monitoring was undertaken using a RION NL-42 noise logger with Type 2 Precision. Calibration was checked prior to and at the conclusion of the measurements with no significant drift. These loggers are capable of measuring continuous sound pressure levels and are able to record L_{Amin}, L_{A90}, L_{A10}, L_{Amax} and L_{Aeq} noise descriptors. The instrument was programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes for the entire monitoring period.

The L_{A90} descriptor is used to measure the background noise level. This descriptor represents the noise level that is exceeded for 90 percent of the time over a relevant period of measurement. In line with the procedures described in the EPA's NPfI, the assessment background level (ABL) is established by determining the lowest tenth-percentile level of the L_{A90} noise data acquired over each period of interest. The background noise level or rating background level (RBL) representing the day, evening and night-time assessment periods is

based on the median of individual ABL's determined over the entire monitoring duration. The RBL is representative of the average minimum background sound level, or simply the background level.

The L_{Aeq} is the equivalent continuous noise level which would have the same total acoustic energy over the measurement period as the varying noise actually measured, so it is in effect an energy average.

Logged data was reviewed and filtered to exclude any extraneous data during the monitoring period. Weather information for the unattended noise logging was obtained from the Bureau of Meteorology Williamtown all weather station for the monitoring period and any data adversely affected by rain, wind (more than 5 m/s as per NPfI) were discarded.

The RBL and ambient LAeq levels are provided in Table 2-2 below. Charts of the noise monitoring are provided in Appendix B.

Table 2-2 Background and Ambient Noise Monitoring Results

Rating background level, L_{A90}, dB(A)			Ambient noise levels, L_{Aeq} dB(A)		
Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
47	47[2] (50)	47[2] (48)	55	55	54

Note 1 Day: 7:00 to 18:00 Monday to Saturday and 8:00 to 18:00 Sundays & Public Holidays
Evening: 18:00 to 22:00 Monday to Sunday & Public Holidays
Night: 22:00 to 7:00 Monday to Saturday and 22:00 to 8:00 Sundays & Public Holidays

Note 2 As outlined in the NPfI, the evening and night criteria or management levels are set no louder than that daytime levels. Number in brackets (XX) represents actual measured RBL determined for assessment period.

Attended noise measurements were also conducted at the long term monitoring location on 3 May 2021 using a RION NL-42 Sound Level Meter with Type 2 Precision. 15-minute measurements were undertaken. The attended noise surveys were conducted with consideration to the procedures described in Australian Standard AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise" and the NSW Noise Policy for Industry (NPfI). Calibration was checked before and after each measurement and no significant drift occurred. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics – Sound level meters – Specifications. The monitoring was undertaken during calm conditions. The attended noise monitoring results are provided in Table 2-3.

Table 2-3 Attended Noise Monitoring Results

Noise Period	Noise Level dB(A)		Noise Sources dB(A)
	L_{Aeq}	L_{A90}	
3/05/2021 11:15am – 11:30am	53	47	Heavy Vehicle Traffic Tomago Road 60-66 Underlying Urban Hum 48-52 Birds 45–50

3. Noise and Vibration Objectives

3.1 Construction Noise

Construction noise is assessed with consideration to DECCW Interim Construction Noise Guidelines (ICNG) (July 2009). The ICNG is a non-mandatory guideline that is usually referred to by local councils and other NSW government entities when construction / demolition works require development approval. The ICNG recommend standard hours for construction activity as detailed in Table 3-1.

Table 3-1 ICNG Recommended Construction Hours

Work type	Recommended standard hours of work
Normal construction	Monday to Friday: 7 am to 6 pm. Saturday: 8 am to 1 pm. No work on Sundays or Public Holidays.
Blasting	Monday to Friday: 9 am to 5 pm. Saturday: 9 am to 1 pm. No work on Sundays or Public Holidays.

The ICNG provides noise management levels for construction noise at residential and other potentially sensitive receivers. These management levels are to be calculated based on the adopted rating background level (RBL) at nearby locations, as shown in Table 3-2.

Table 3-2 ICNG Noise Guidelines at Receivers

Period	Management Level $L_{Aeq(15\ min)}$
Residential Recommended standard hours	Noise affected level: RBL + 10 Highly noise affected level: 75 dB(A)
Residential Outside recommended standard hours	Noise affected level: RBL + 5
Classrooms at schools and other educational institutions	Internal Noise Level 45 dB(A) (applies when properties are being used)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	65 dB(A)
Offices, retail outlets (external)	70 dB(A)
industrial premises (external)	75 dB(A)

The above levels apply at the boundary of the most affected residences / offices or within 30 m from the residence where the property boundary is more than 30 m from the residence.

The *noise affected level* represents the point above which there may be some community reaction to noise. Where the *noise affected level* is exceeded all feasible and reasonable work practices to minimise noise should be applied and all potentially impacted residents should be informed of the nature of the works, expected noise levels, duration of works and a method of contact. The *noise affected level* is the background noise level plus 10 dB(A) during recommended standard hours and the background noise level plus 5 dB(A) outside of recommended standard hours.

The *highly noise affected level* represents the point above which there may be strong community reaction to noise and is set at 75 dB(A). Where noise is above this level, the relevant authority may require respite periods by restricting the hours when the subject noisy activities can occur, considering:

- Times identified by the community when they are less sensitive to noise (such as mid-morning or mid-afternoon for works near residences).
- If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

It is understood no construction works are planned as part of this proposal and therefore is not considered further in this assessment.

3.2 Vibration Guidelines

3.2.1 Human Exposure

Vibration goals the were sourced from the DECCW's *Assessing Vibration: a technical guideline*, which is based on guidelines contained in British Standard (BS) 6472–1992, *Evaluation of human exposure to vibration in buildings (1–80 Hz).*

Vibration, at levels high enough, has the potential to cause damage to structures and disrupt human comfort. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent as follows:

- continuous vibration continues uninterrupted for a defined period and includes sources such as machinery and continuous construction activities
- impulsive vibration is a rapid build up to a peak followed by a damped decay. It may consist of several cycles at around the same amplitude, with durations of typically less than two seconds and no more than three occurrences in an assessment period. This may include occasional dropping of heavy equipment or loading activities
- intermittent vibration occurs where there are interrupted periods of continuous vibration, repeated periods of impulsive vibration or continuous vibration that varies significantly in magnitude. This may include intermittent construction activity, impact pile driving, jack hammers.

The preferred and maximum values for continuous and impulsive vibration are defined in Table 2.2 of the guideline and are reproduced in Table 3-3 for the applicable receivers.

Table 3-3 Preferred and Maximum Levels for Human Comfort

Location	Assessment Period[3]	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Impulsive vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14

Note 3 Daytime is 7:00am to 10:00pm and Night-time is 10:00pm to 7:00am

The acceptable vibration dose values (VDV) for intermittent vibration are defined in Table 2.4 of the guideline and are reproduced in Table 3-4 for the applicable receiver type.

Table 3-4 Acceptable Vibration Dose Values for Intermittent Vibration (m/s1.75)

Location	Daytime [4]		Night-time [4]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas[5]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Note 4 Daytime is 7:00 to 22:00 and night-time is 22:00 to 7:00: and
Note 5 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be needed to assess intermittent values against the continuous or impulsive criteria for critical areas.

3.2.2 Building Damage

Currently, there is no Australian Standard that sets the criteria for the assessment of building damage caused by vibration. Guidance of limiting vibration values is attained from reference to the following International Standards and Guidelines:

- British Standard BS7385.2 - 1993 *Evaluation and Measurement for Vibration in Buildings*, Part 2 - Guide to damage levels from ground borne vibration
- German Standard DIN 4150-3: 1999-02 Structural Vibration – Part 3: *Effects of vibration on structures*.

The recommended Peak Particle Velocity (PPV) guidelines for the possibility of vibration induced building damage are derived from the minimum vibration levels above which any damage may occur are presented in Table 3-5 for DIN 4150-3: 1999-02 and Table 3-6 for BS7385.2 – 1993.

Table 3-5 DIN 4150-3 Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on structures

Type of Structure	Peak Component Particle Velocity, mm/s			
	Vibration at the foundation at a frequency of			Vibration of horizontal plane of highest floor at all frequencies
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz*	
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20-40	40-50	40
Dwellings and buildings of similar design and/or occupancy	5	5-15	15-20	15
Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 of table 5-7 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note 6 At frequencies above 100Hz, the values given in this column may be used as minimum values

Table 3-6 BS7385.2 Transient Vibration Guideline Values for Potential building - Cosmetic Damage

Building Type[8]	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz[7]	15 Hz and above[7]
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures. Residential or light commercial type buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note 7 Values referred to are at the base of the building: and
Note 8 For transient vibration effecting unreinforced or light framed structures at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

Unlike noise which travels through air, the transmission of vibration is highly dependent on substratum conditions between the source/s and receiver. Also dissimilar to noise travelling through air, vibration levels diminish quickly over distance, thus an adverse impact from vibration on the broader community is not typically expected. Vibration during works is considered an intermittent source associated with two main types of impact: disturbance at receivers and potential architectural/structural damage to buildings. Generally, if disturbance issues are controlled, there is limited potential for structural damage to buildings.

Given the nature of the proposal and distances of source to receivers, potential vibration impacts are considered negligible and are not considered further in this assessment.

3.3 Original Operational Noise Requirements

Schedule 3 Condition 7 of the original approval are provided in Figure 3-1 below.

NOISE

Noise Impact Assessment Criteria

7. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 4.

Table 4: Project Noise Limits (dB(A))

Day	*Evening*	*Night*	Location
	($L_{Aeq\ (15\ minute)}$)		
50.5	51.0	45.0	At any residence or other noise sensitive receiver

Notes:

a) To determine compliance with noise level limits in the above table, noise from the project is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the the DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.

b) The noise emission limits identified in the above table apply under meteorological conditions of wind speeds of up to 3 m/s at 10 metres above ground level.

Figure 3-1 Original Project Noise Limits

3.4 Operational Noise – NSW Noise Policy for Industry

The NPfI provides guidance on the assessment of operational noise impacts associated with the projects operation. The NPfI assessment procedure has two components:

- Controlling intrusive noise impacts in the short-term for residences
- Maintaining noise level amenity for residences and other land uses.

Project Intrusiveness Noise Levels

According to the NPfI, the intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the $L_{Aeq,15min}$ descriptor) does not exceed the background noise level

measured in the absence of the source by more than 5 dB(A). The project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

$L_{Aeq,15minute}$ Intrusiveness noise level = Rating Background Level ('RBL') plus 5 dB(A)

Based on the measured and adopted noise levels outlined in Table 2-2, The intrusiveness noise levels for residential receivers are provided in 7.

Table 3-7 Intrusiveness Noise Levels

Period	RBL. L_{A90}, dB(A)	Intrusiveness noise level (RBL + 5), dB(A)
Day[9]	47	52
Evening[9]	47	52
Night[9]	47	52

Note 9 Day 7:00 to 18:00 Monday to Saturday and 8:00 to 18:00 Sundays & Public Holidays
Evening: 18:00 to 22:00 Monday to Sunday & Public Holidays
Night: 22:00 to 7:00 Monday to Saturday and 22:00 to 8:00 Sundays & Public Holidays

Amenity Noise Levels

The project amenity noise levels for different time periods of day are determined with consideration to Section 2.4 of the NPfI. The NPfI recommends amenity noise levels ($L_{Aeq,period}$) for various receivers including residential, commercial, industrial receivers and sensitive receivers such as schools, hotels, hospitals, churches and parks. These "recommended" amenity noise levels represent the objective for total industrial noise experienced at a receiver location. However, when assessing a single industrial development and its impact on an area, "project" amenity noise levels apply.

The NPfI recommended amenity noise levels are shown in 8 below.

Table 3-8 NPfI Recommended Amenity Noise Levels

Type of Receiver	Noise Amenity Area	Time of Day[10, 11]	Recommended amenity noise level, LAeq, dB(A)[12, 13]
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day

Type of Receiver	Noise Amenity Area	Time of Day[10, 11]	Recommended amenity noise level, LAeq, dB(A)[12, 13]
School classroom (internal)	All	Noisiest 1-hour period when in use	35[14]
Hospital ward	All		
- Internal		Noisiest 1-hour	35
- External		Noisiest 1-hour	50
Place of worship (internal)	All	When in use	40
Passive recreation (e.g. national park)	All	When in use	50
Active recreation (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	When in use	Add 5 dB(A) to recommended noise amenity area

Note 10 Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am.

Note 11 On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.

Note 12 The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Note 13 The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated

Note 14 In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable LAeq noise level may be increased to 40 dB LAeq(1hr)

As previously noted, the original acoustic assessment undertaken for the asphalt plant classified nearest residential receptors as 'Urban'. This is consistent with attended observations and measurement results for this current proposal. Additionally, it is consistent with the NPfI classification for urban which states in Table 2.3 for determining which or the receiver categories applies:

Urban – an area with an acoustical environment that:

- is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources
- has through-traffic with characteristically heavy and continuous traffic flows during peak periods
- is near commercial districts or industrial districts

- has any combination of the above.

Consistent with the recommendations contained within the NPfI, the Urban residential category has been utilised for the purposes of this assessment.

High Traffic

The level of transport noise, road traffic noise in particular, may be high enough to make noise from an industrial source effectively inaudible, even though the LAeq noise level from that industrial noise source may exceed the project amenity noise level. In such cases the project amenity noise level may be derived from the LAeq, period(traffic) minus 15 dB(A).

This high traffic project amenity noise level may be applied only if all the following apply:

- traffic noise is identified as the dominant noise source at the site
- the existing traffic noise level is 10 dB or more above the recommended amenity noise level for the area
- it is highly unlikely traffic noise levels will decrease in the future.

In this case based on noise measurements and attended observations when comparing to the above critieria, the high traffic application does not apply.

To ensure that the total industrial noise level (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level that applies for each new industrial noise source is determined as follows:

Project amenity noise level = Recommended amenity noise level (Table 3-8) – 5dB(A)

Additionally, given that the intrusiveness noise level is based on a 15-minute assessment period and the project amenity noise level is based on day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,(period)}$ level to a representative $L_{Aeq,15minute}$ level in order to standardise the time periods.

$L_{Aeq(15minute)} = L_{Aeq(period)} + 3dB(A)$

The project amenity noise levels ($L_{Aeq,15min}$) for urban residences and other receptors applied for this project are shown in Table 3-9.

Table 3-9 Project Amenity Noise Levels

Type of Receiver	Noise Amenity Area	Time of Day	Recommended Noise Level, dB(A)	
			$L_{Aeq,\ Period}$	$L_{Aeq,\ 15min}$
Residence	Urban	Day	60 – 5 = 55	55 + 3 = **58**
		Evening	50 – 5 = 45	45 + 3 = **48**
		Night	45 – 5 = 40	40 + 3 = **43**
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	All	Day	65 – 5 = 60	60 + 3 = **63**
		Evening	55 – 5 = 50	50 + 3 = **53**
		Night	50 – 5 = 45	45 + 3 = **48**
Commercial Premises	All	When in	65 – 5 = 60	60 + 3 = **63**

Type of Receiver	Noise Amenity Area	Time of Day	Recommended Noise Level, dB(A)	
			$L_{Aeq,\ Period}$	$L_{Aeq,\ 15min}$
		use		
Industrial premises	All	When in use	70 – 5 = 65	65 + 3 = **68**

Project Noise Trigger Levels

The project noise trigger level is the lower of the intrusiveness and the amenity noise levels. Provided in Table 3-10 are the established project noise trigger levels for the assessment locations within the study area. Table 3-10 presents the project noise trigger levels for the day, evening, and night-time periods.

Table 3-10 Project Noise Trigger Levels

Type of receiver	Assessment period	Intrusiveness noise levels, $L_{Aeq,15min}$, dB(A)	Amenity noise levels, $L_{Aeq,15min}$, dB(A)	Project noise trigger levels, $L_{Aeq,15min}$, dB(A)
Residential Urban	Day	52	58	**52**
	Evening	52	48	**48**
	Night	52	43	**43**
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	Day	-	63	**63**
	Evening	-	53	**53**
	Night	-	48	**48**
Commercial premises	When in use	-	63	**63**
Industrial Premises	When in use	-	68	**68**

Maximum Noise Level Assessment

The NPfI requires the potential for sleep disturbance to be assessed by considering maximum noise levels events during the night-time period.

Where the subject development/premises night-time noise levels at a residential location exceed the following screening levels a detailed maximum noise level event assessment should be undertaken:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

Based on the adopted background noise levels during the night, the sleep disturbance criteria for the nearest noise sensitive residential receivers are provided in Table 3-11.

Table 3-11 Night-Time Sleep Disturbance Screening Levels

Receiver type	Assessment Level $L_{Aeq,15min}$, dB(A)	Assessment Level L_{AFmax}, dB(A)
Residential	52	62

- *Maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep*
- *One or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.*

The above references identify that internal noise levels of 50 to 55 dB(A), are unlikely to cause awakenings. On the assumption that there is a 10 dB(A) outside-to-inside noise loss through an open window (see Section 2.6 of the NPfI, p15), this indicates that external noise levels of LAmax 60 to 65 dB(A) are unlikely to cause awakening reactions.

3.5 NSW Road Noise Policy (RNP)

The NSW Road Noise Policy (RNP) recommends various criteria for different road and residential developments and uses. Although it is not mandatory to achieve the noise assessment criteria in the RNP, proponents will need to provide justification if it is not considered feasible or reasonable to achieve them. Based on the definitions in the RNP, Tomago Road is considered to be a sub-arterial road. Based on this, the following noise goals for residences taken from Table 3 of the RNP are provided in Table 3-12 Below.

Table 3-12 Road Noise Policy Goals

Road Category	Day	Night
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use development	60 $L_{Aeq(15hr)}$ External	55 $L_{Aeq(9hr)}$ External

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding ‘no build option’.

4. Assessment of Potential Impacts

4.1 Operational Noise

A noise survey of the asphalt plant was undertaken by RAPT Consulting on 29 October 2019. The plant at the time was fully operational inclusive of the Asphalt Plant itself, front end loader, fork lift and haulage trucks using a RION NL-42 Sound Level Meter with Type 2 Precision. Calibration was checked before and after each measurement and no significant drift occurred. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics – Sound level meters. The measurement locations are shown in Figure 4-1 and the attended noise monitoring results are provided in Table 4-1.

Figure 4-1 Noise Survey Locations

Table 4-1 Noise Survey Results

Location	Noise Level dB(A)	
	L_{Aeq}	L_{A90}
North Plant	73	70
South Plant	82	79
East Plant	66	65

West Plant	69	68

Additional attended noise measurements were undertaken on 18 October 2021 outside the northern boundary of the plant while fully operational inclusive of the asphalt plant itself, front end loader, fork lift and haulage trucks. The purpose was to measure/assess source contribution C- and A-weighted Leq,T levels over same time period to ascertain whether low frequency noise may be a factor associated with the noise emanating from the current facility. The results of the measurement are provided in Table 4-2.

Table 4-2 Plant Noise Measurement Results

Location	Noise Level dB		
	L_{Aeq}	L_{Ceq}	Difference
North of Plant 2:50pm – 3:05pm	64.4	75.7	11.3

All of the noise sources in were operating and have been assessed, based on the noise data available, for annoying noise characteristics. The proposed operational noise sources are generally broadband in nature and have not demonstrated annoying characteristics as per the guidance contained in Fact Sheet C of the NPfI.

Acoustic modelling was undertaken utilising the plant survey noise levels using Bruel and Kjaer's "Predictor" to predict the effects of operational noise. Predictor is a computer program for the calculation, assessment and prognosis of noise propagation. Predictor calculates environmental noise propagation according to ISO 9613-2, "Acoustics – Attenuation of sound during propagation outdoors". Terrain topography, ground absorption, atmospheric absorption and relevant shielding objects are taken into account in the calculations.

Enhancing Weather Conditions

Fact Sheet D of the NPfI provides guidance for accounting for noise-enhancing weather conditions. Two options are available to consider meteorological effects:

1. Adopt the noise-enhancing meteorological conditions for all assessment periods for noise impact assessment purposes without an assessment of how often these conditions occur – a conservative approach that considers source-to-receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night. Or

2. Determine the significance of noise-enhancing conditions. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night-time period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.

As a detailed analysis of the significance of noise enhancing conditions has not been undertaken, option 1 has been utilised. Table D1 from the NPfI is reproduced in Table 4-2 and shows the noise enhancing meteorological conditions that have been adopted for this assessment

Table 4-3Noise Enhancing Meteorological Conditions

Meteorological Conditions	Meteorological Parameters
Noise-enhancing meteorological conditions	Daytime/evening: stability category D with light winds (up to 3 m/s at 10 m AGL). Night-time: stability category F with winds up to 2 m/s at 10 m AGL.

Note 15 m/s = metres per second; m = metres; AGL = above ground level; where a range of conditions is nominated, the meteorological condition delivering the highest-predicted noise level should be adopted for assessment purposes. However, feasible and reasonable noise limits in consents and licences derived from this process would apply under the full range of meteorological conditions nominated under standard or noise-enhancing conditions as relevant. All wind speeds are referenced to 10 m AGL. Stability categories are based on the Pasquill–Gifford stability classification scheme.

Key assumptions in the model include:

- topographical information was obtained from NSW Government Spatial Services
- all cleared areas were modelled considering a conservative ground factor of 0.8 to account for grassed areas
- all residential receivers were modelled at 1.5 metres above the ground surface

All items of plant were modelled operating simultaneously to simulate a worst case scenario for day, evening and night-time periods. The modelled results for day, evening and night-time are provided in figures 4-2 – 4-4.

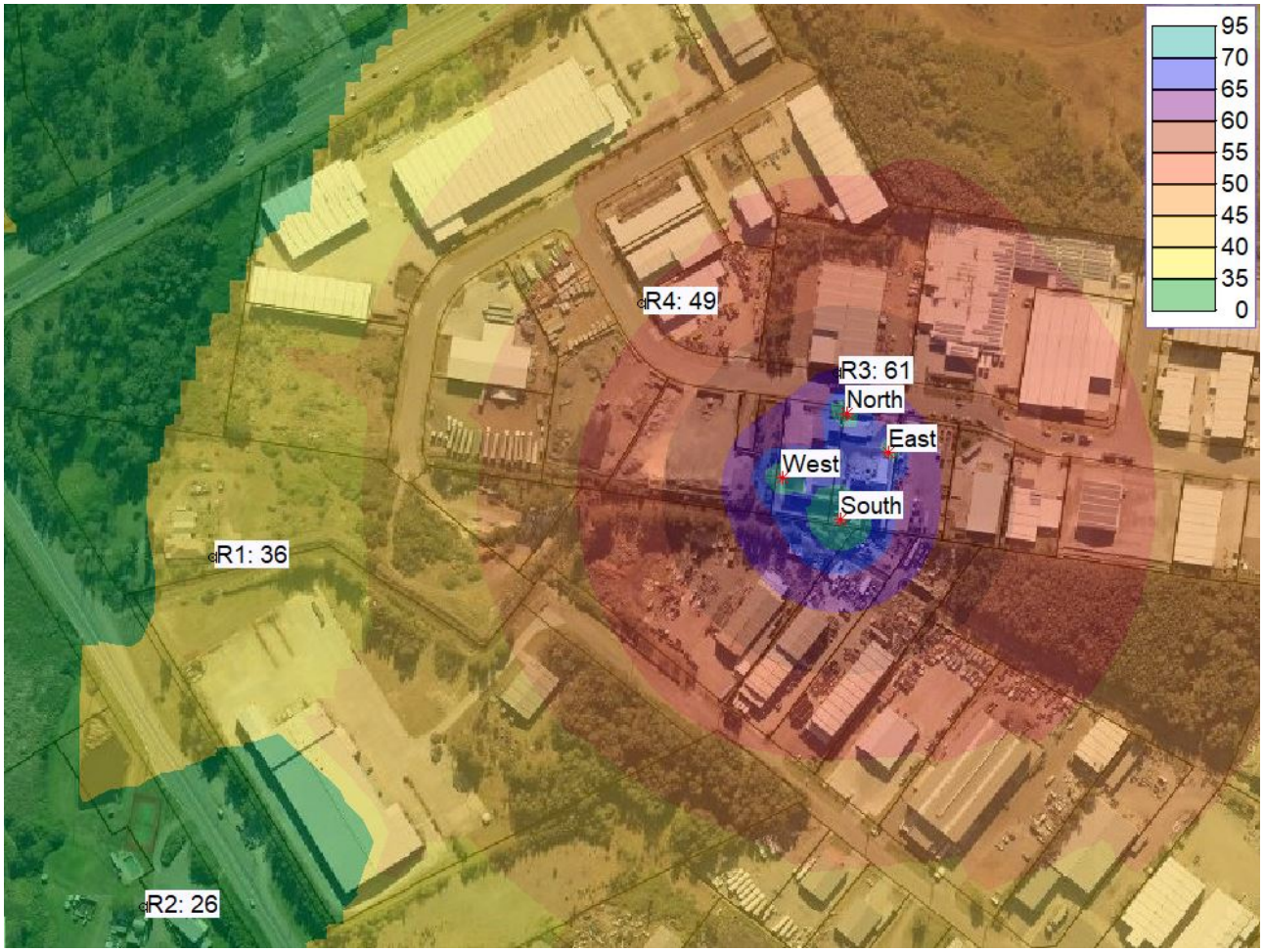


Figure 4-2 Daytime Operational Modelled Results dB(A) Leq(15min)

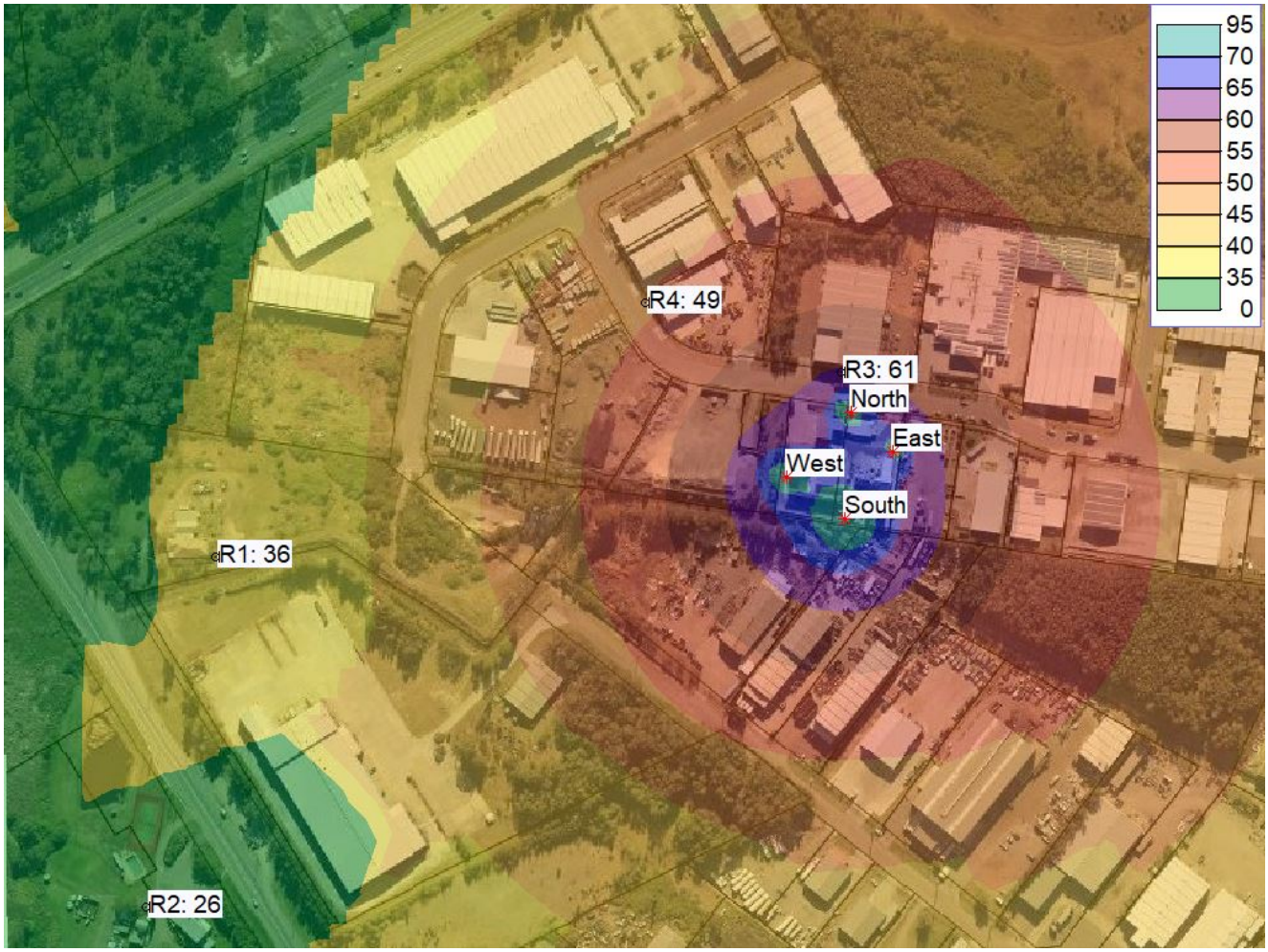


Figure 4-3 Evening Operational Modelled Results dB(A) Leq(15min)

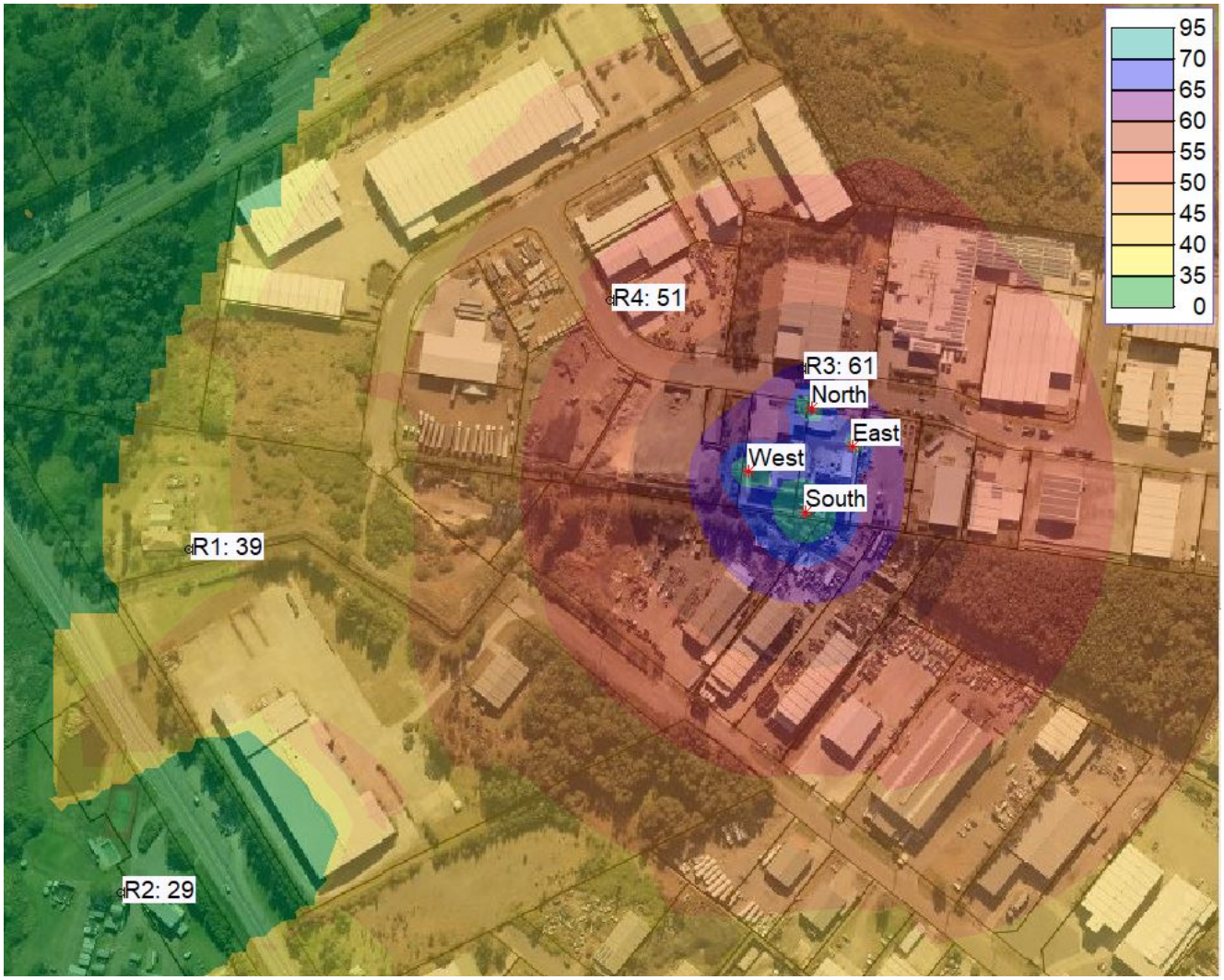


Figure 4-4 Nighttime Operational Modelled Results dB(A) Leq(15min)

The results of the modelling indicate compliance can be expected during day, evening and night-time at all nearest receivers.

The results of the assessment also indicate sleep disturbance noise goals are expected to be safely complied with. While compliance is expected to be achieved for the proposal, it is recommended that the proposal implement an operational noise management plan as part of its operations to deal with the unlikely occurrence of excessive noise emanating from operations.

Plant Operations

Plant operations data for the monitoring period was provided to RAPT Consulting. The plant was operational from 26 – 30 April from 12:00pm to 5:00am. Noise logging data was compared from 7:00am – 12:00pm (non-operational) and 12:00pm – 6:00pm (operational) during these dates. The recorded overall operational and non-operational ambient noise levels were utilised to derive the noise contribution from the asphalt plant at R1 through the logarithmic subtraction method. The results are provided in Table 4-4.

Table 4-4 Calculated Plant Noise Contribution

R1	Leq dB(A)
Operational 12pm – 6pm	54.2
Non-Operational 7am – 12pm	54.1
Noise Contribution dB(A)	37.8

The results of the calculated plant noise contribution show excellent correlation with the noise survey and modelling results and re-confirm compliance with project noise trigger levels.

Road Noise

Traffic information pertaining to the proposal has been sourced from McLaren Traffic Engineering & Road Safety Consultants *TRAFFIC AND PARKING IMPACT ASSESSMENT OF THE PROPOSED MODIFICATION TO THE EXISTING ASPHALT BATCHING PLANT AT 25 - 27 KENNINGTON DRIVE, TOMAGO.*

The proposed development in relation to the peak production rate of the Asphalt Batching Plant is not changing, rather, the site will run for longer and more frequently to achieve the increase in volume such that the peak traffic associated with the site will not increase. Additionally, the proposed development in relation to the amount of materials stored on the Materials Storage and Processing Yard is not changing, rather, the site will operate for longer and more frequently to increase the utilisation threshold of materials per year.

Information regarding the existing situation indicates over a 12 month period, the peak daily trucks associated with the import of materials was 50 trucks and 37 trucks for exported materials. This means a peak of 87 truck movements under per day the current situation of 150,000 tonnes per year. The number of truck movements per day as mentioned above is not expected to increase, rather the site may operate more frequently. However for the purposes of this assessment an assumption has been made that potentially mean peak daily movements could increase to 144 truck movements per day based on an approved 250,000 tonne per year limit. This would mean an increase of 57 movements per day.

Peak hour traffic survey information contained within the report is provided in Table 4-5. A general rule of thumb is that the peak hour is 8-12% of the AADT. Therefore 10% has been adopted.

Table 4-5 Traffic Information

Road Situation	Peak Hour Traffic	AADT	Additional Vehicles
Intersection Kennington Dr and Old Punt Road	381	3,810	57
Intersection Pacific Hwy and Old Punt Road	2963	29,630	57
Intersection Pacific Hwy and Tomago Road	4236	42,360	57
Intersection Old Punt Road and Tomago Road	1559	15,590	57

As can be seen from Table 4-5, the associated road network is heavily trafficked. Site traffic will have blended in with local traffic by the time it goes past the nearest sensitive receivers. To increase noise levels by 2dB(A) one would have to increase the cumulative traffic volume by 60%. The number of vehicles on the road network is negligible and will not increase overall traffic noise levels on the surrounding road network. Therefore, compliance is expected.

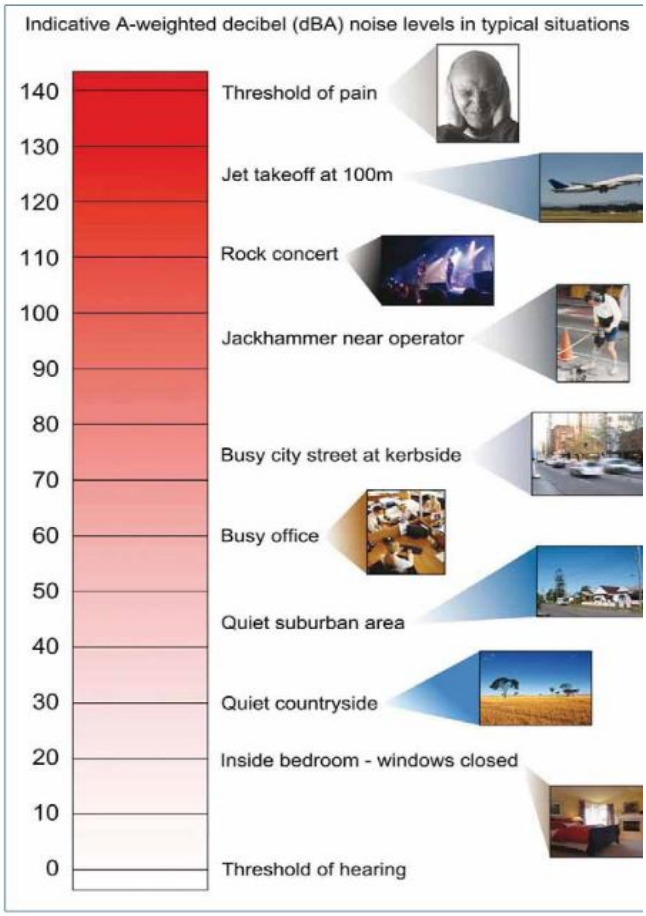
Additionally, the existing site and traffic inclusive of other traffic sources in the area already contribute to deceleration and acceleration at traffic signals and other traffic control situations. Deceleration and acceleration noises differ from the cruising traffic noise that occurs in the absence of traffic control device. However, with our past experience where noise levels from vehicles were measured at an intersection for both free-flowing and stop-and-go conditions, and the levels were measured to fall within 1dB(A) for each scenario. This outcome can be explained by there being relatively quiet periods with very little to no traffic noise generated from stopped or slow moving vehicles at an intersection, while there is generally more noise generated from faster continuous moving vehicles found under free-flowing traffic conditions. Therefore, while accelerating and decelerating may alter the 'character' of noise, it will not significantly alter the absolute level of noise.

5. Conclusion

This acoustic assessment has been undertaken Monteath & Powys to inform a Modification Application SSD (Modification Report)– Asphalt Batching Plant 25-27 Kennington Drive, Tomago (Lots 14 and 15 of DP 270494) in the Port Stephens local government area.

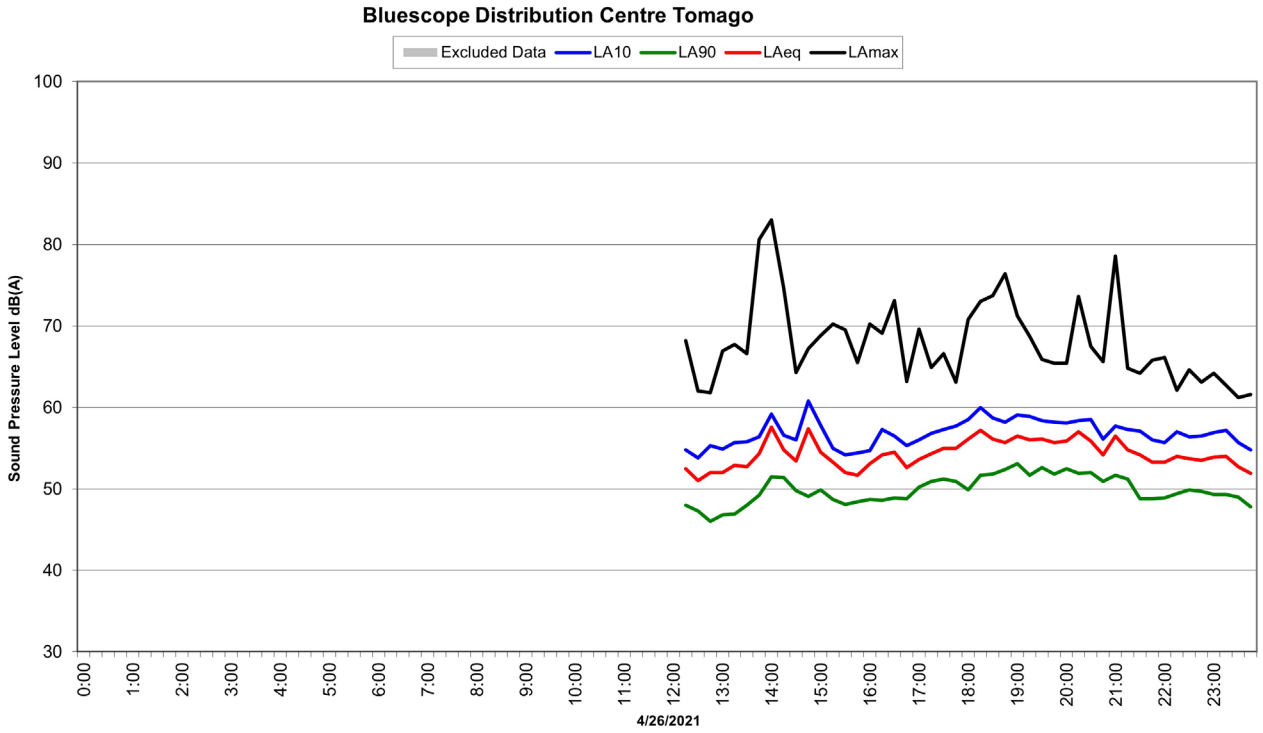
The results of the assessment suggest compliance with all noise and vibration goals outlined in the assessment can be achieved. Therefore, from an acoustic perspective, the proposal is considered acceptable.

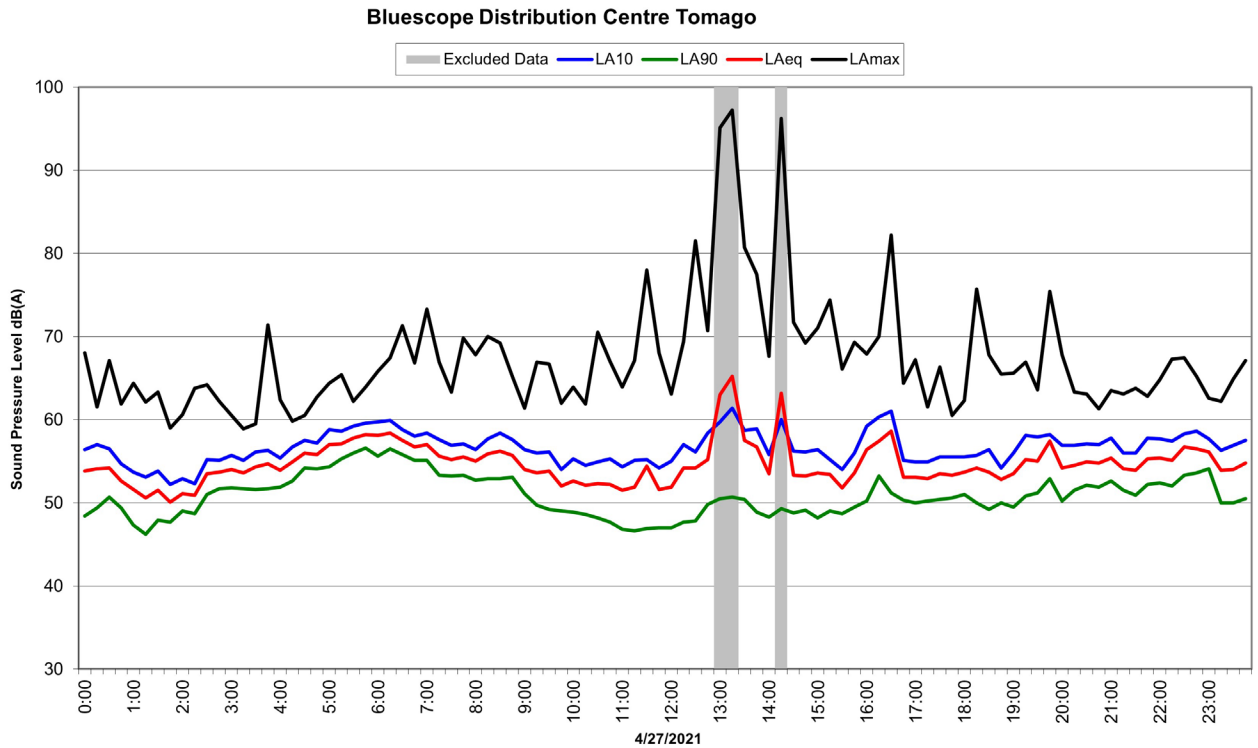
Appendix A: Glossary of Acoustic Terms

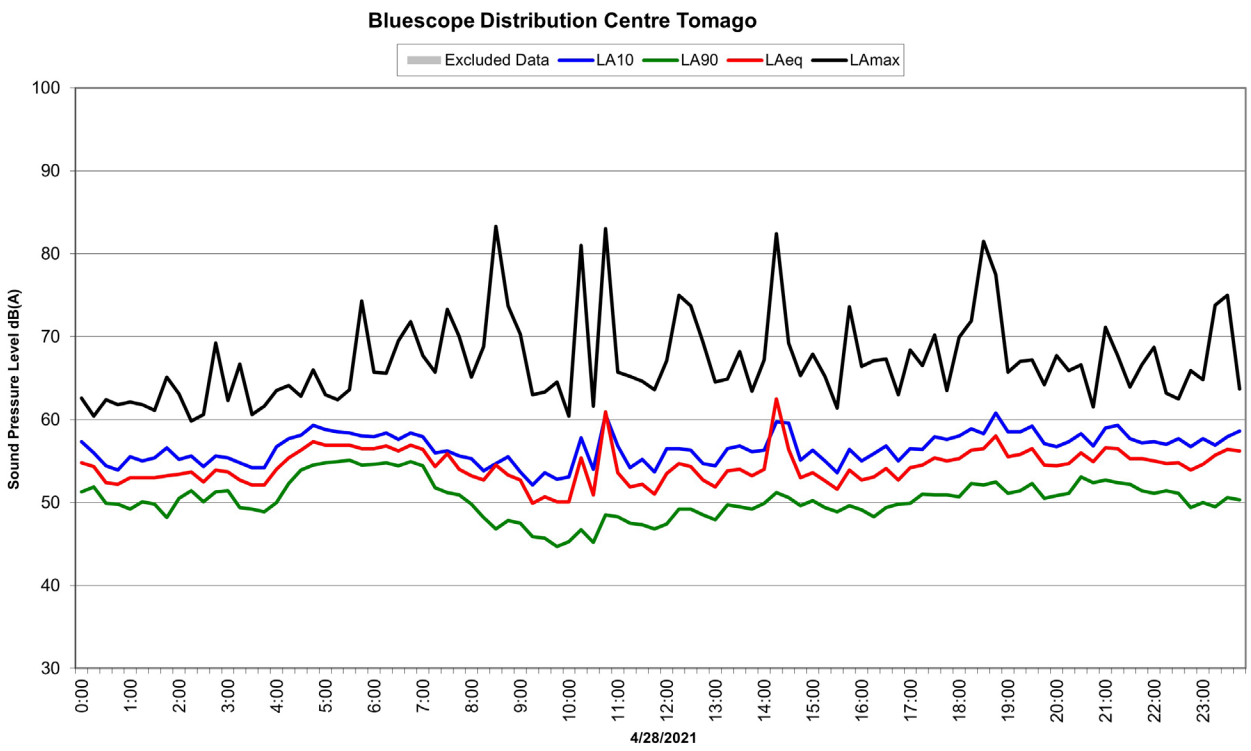
Term	Definition
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics. The picture below indicates typical noise levels from common noise sources. 
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A10(period)}$	The sound pressure level that is exceeded for 10% of the measurement period.
$L_{A90(period)}$	The sound pressure level that is exceeded for 90% of the measurement period.
L_{Amax}	The maximum sound level recorded during the measurement period.
Noise sensitive receiver	An area or place potentially affected by noise which includes:

	A residential dwelling. An educational institution, library, childcare centre or kindergarten. A hospital, surgery or other medical institution. An active (e.g. sports field, golf course) or passive (e.g. national park) recreational area. Commercial or industrial premises. A place of worship.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
Feasible and Reasonable (Noise Policy for Industry Definition)	**Feasible** mitigation measure is a noise mitigation measure that can be engineered and is practical to build and/or implement, given project constraints such as safety, maintenance and reliability requirements. Selecting **Reasonable** measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the mitigation measure. To make a judgement, consider the following: Noise impacts Noise mitigation benefits Cost effectiveness of noise mitigation Community views.
Sound power level (SWL)	The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in dB(A).

Appendix B Noise Monitoring Charts



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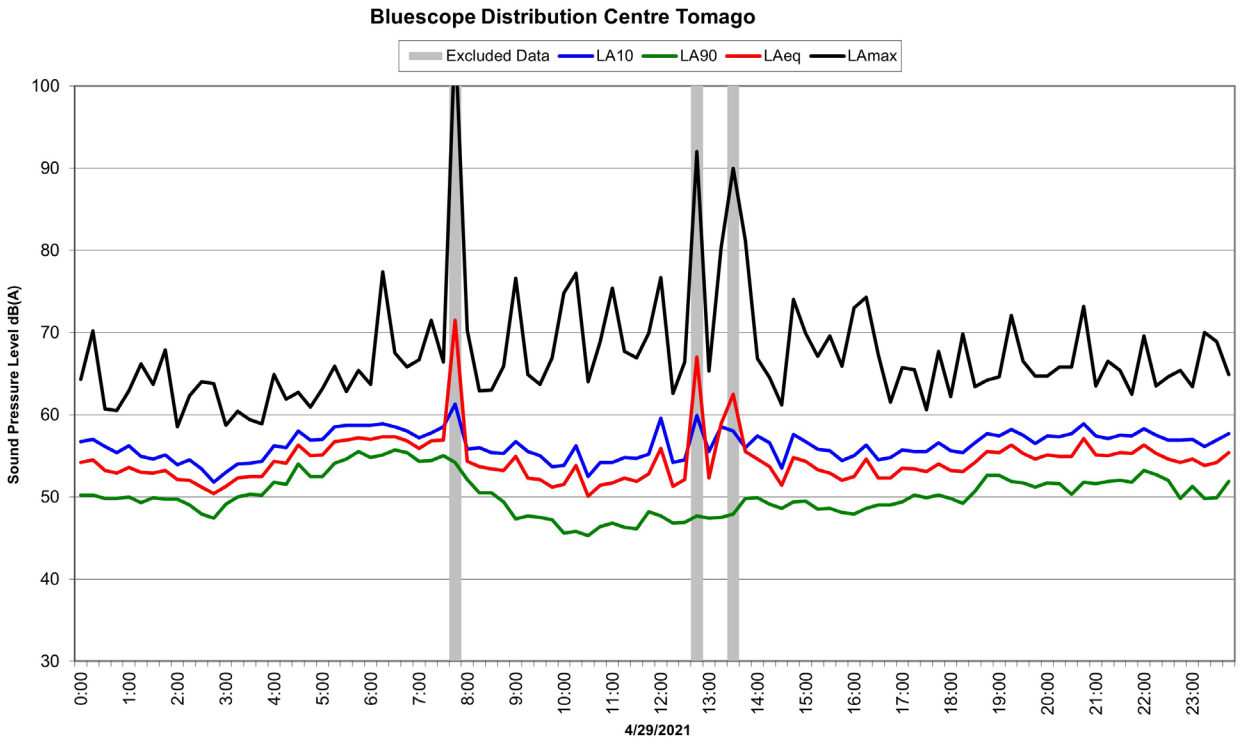
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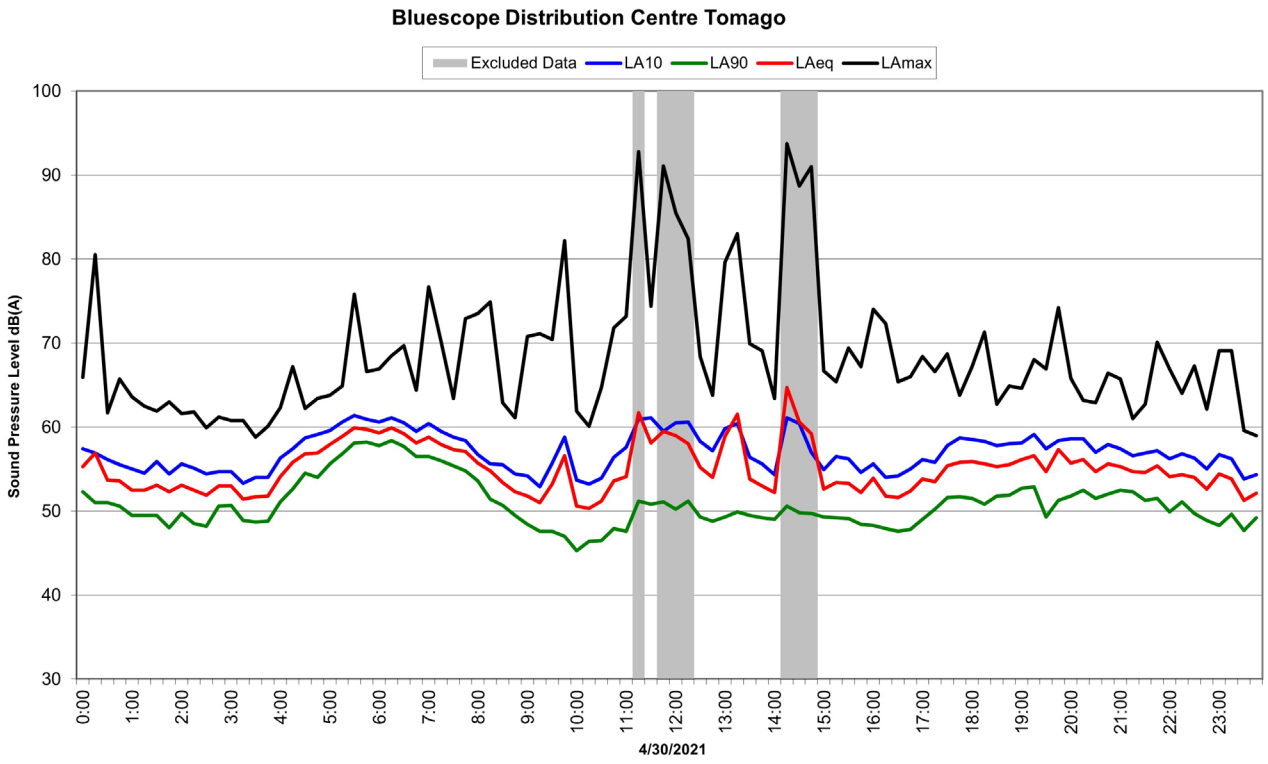
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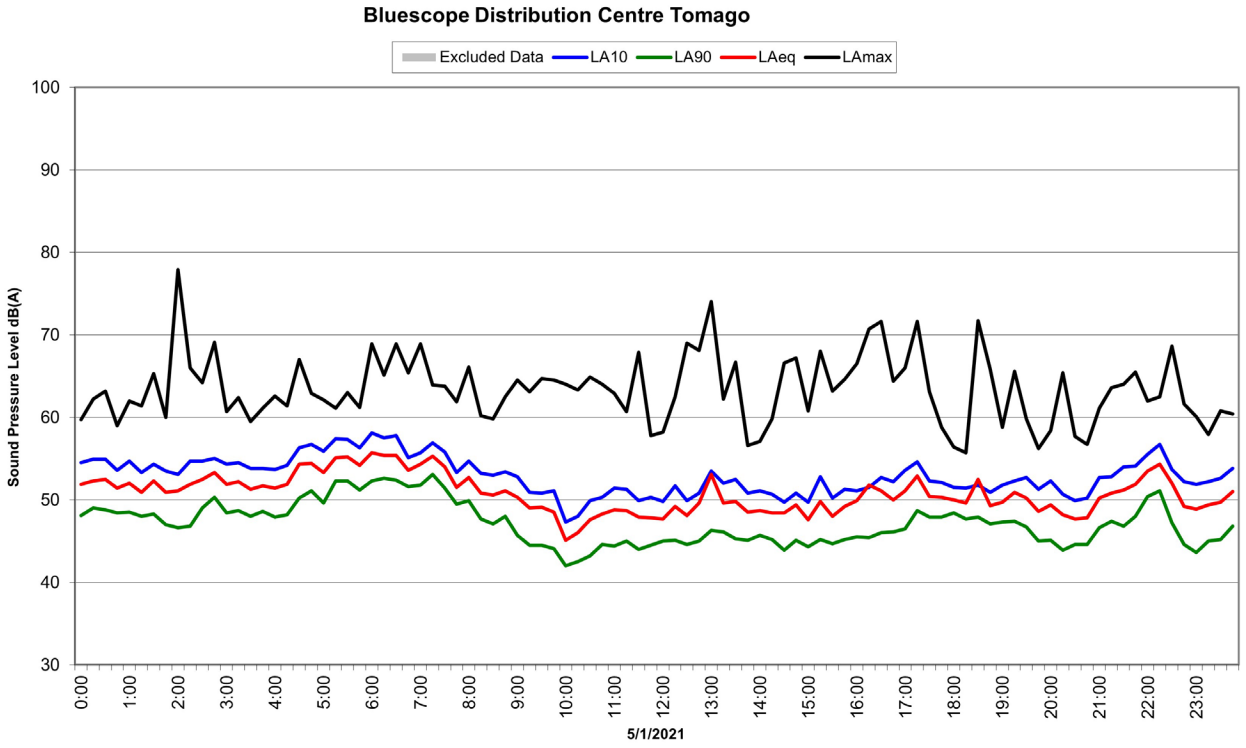
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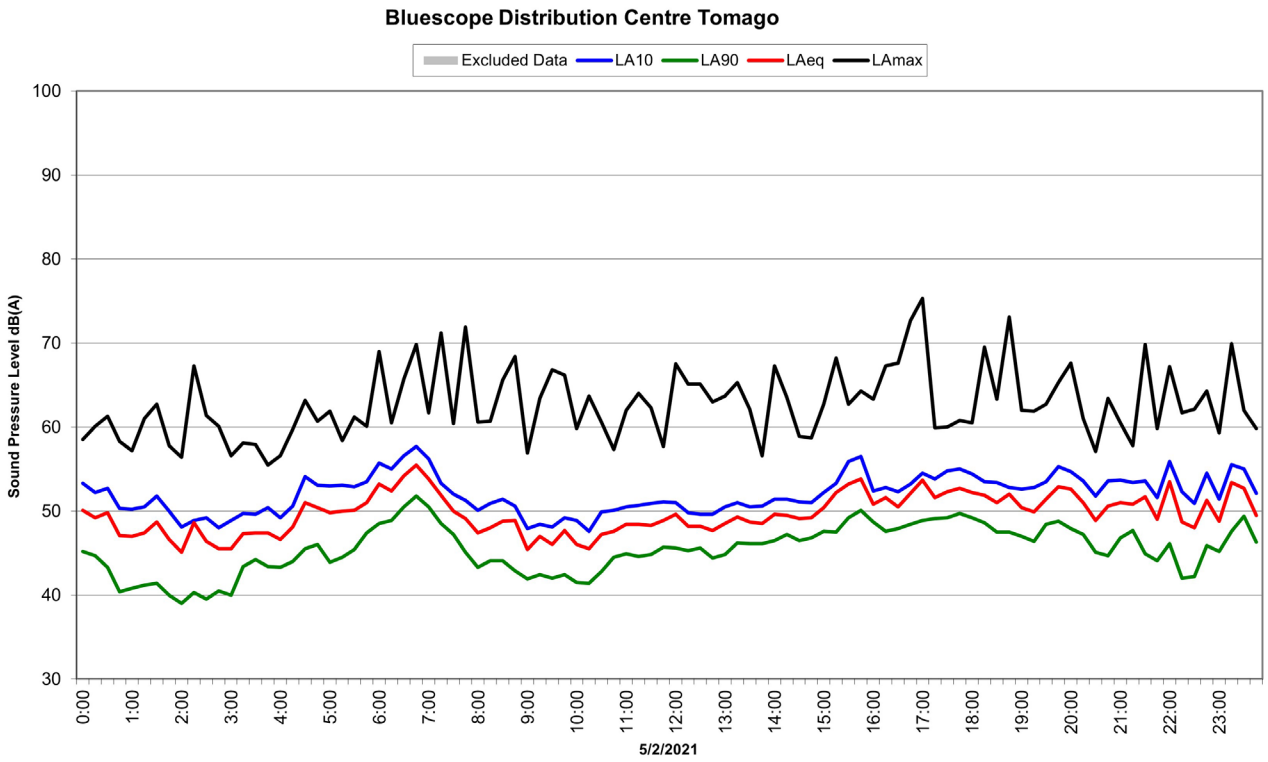
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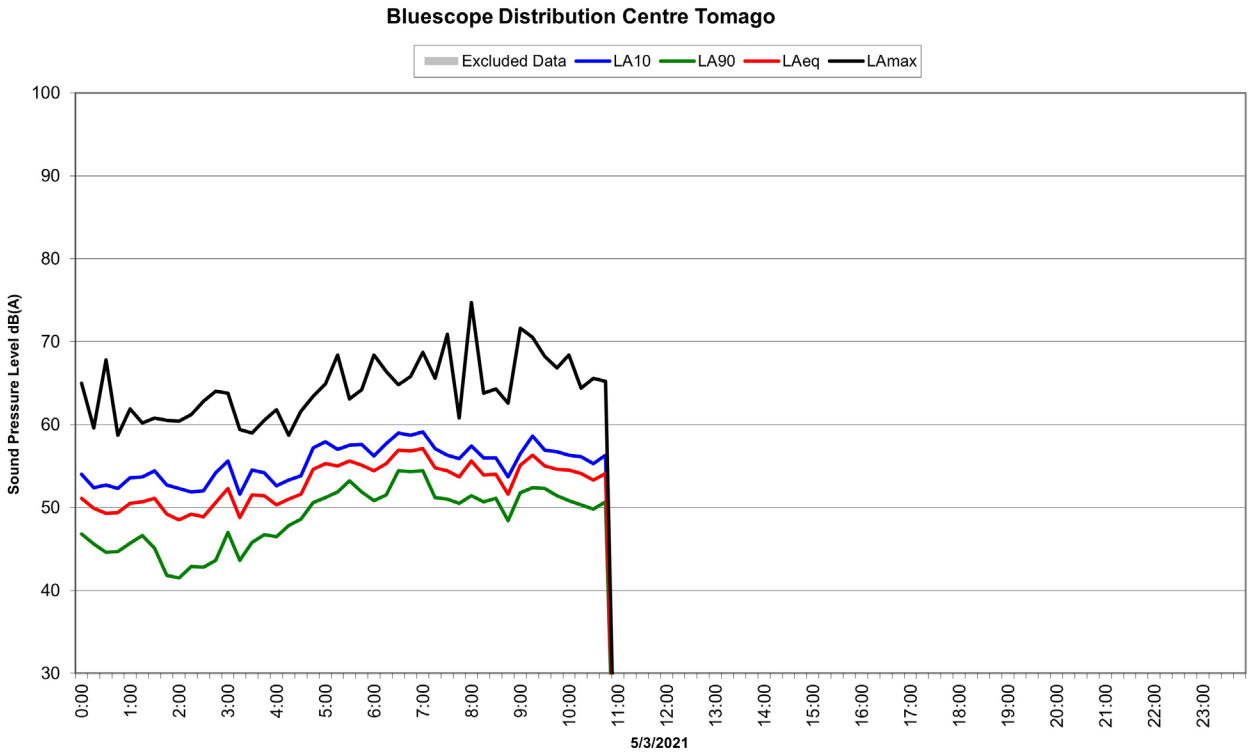
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